

DOCUMENT RESUME

ED 425 852

PS 027 222

TITLE The Effect of Nutrition Education on Third Graders' School Lunch Consumption in a School Offering Food Pyramid Choice Menus.

SPONS AGENCY Oregon State Dept. of Education, Salem. Child Nutrition Div.

PUB DATE 1998-08-00

NOTE 34p.

PUB TYPE Reports - Research (143)

EDRS PRICE MF01/PC02 Plus Postage.

DESCRIPTORS *Eating Habits; Food Service; *Food Standards; Grade 3; Guidelines; Intervention; *Lunch Programs; *Nutrition; *Nutrition Instruction; Primary Education

IDENTIFIERS Dietary Guidelines for Americans; *Food Guide Pyramid; Menu Planning; Oregon; School Lunch Program

ABSTRACT

Elementary school lunches planned and served under Oregon's Food Pyramid Choice Menus (FPCM) system are based on the Dietary Guidelines for Americans, and they comply with the current U.S. Department of Agriculture menu standards for school lunches. The study discussed in this report was conducted from February through April 1997; data were analyzed during 1997 and 1998. The study was designed to answer the following question: Will a 4-week nutrition education intervention affect the foods selected and eaten by third graders from FPCM? During four weekly Team Nutrition education programs, children played an active role in learning about how the foods they eat grow, the Food Guide Pyramid, healthy meal planning, and taste testing of fruits and vegetables. After the intervention, it was found that third-graders selected and ate more fruits from their lunches and consumed more vitamin A and dietary fiber from lunches than they did before the intervention. Third-graders participating in nutrition education activities appeared to be more likely to increase their intake of fruits, vegetables, and grain products from lunch than did children from nonparticipating classes. The intervention did not show evidence of influencing fat consumption from Food Pyramid Choice Menus. The report concludes that the availability of a wide variety of fruits, vegetables, and grain products in school lunches combined with nutrition education programming that increases awareness of these foods can have a positive effect on their consumption from school lunches, but other types of nutrition education may be more effective in decreasing fat intake from lunches. Includes three appendices: (1) "Nutrition Education Lesson Plans"; (2) "FPCM Menu Items Offered during Control and Intervention Periods"; and (3) "Parent's Questionnaire on 'Readiness to Change'." (LPP)

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The Effect of Nutrition Education on Third Graders' School Lunch Consumption in a School Offering Food Pyramid Choice Menus

A Research Report to the Child Nutrition Division, Oregon Department of Education

Submitted by:

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Department of Nutrition and Food Management
Oregon State University

August 1998

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**The Effect of Nutrition Education on Third Graders' School Lunch Consumption in
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The Effect of Nutrition Education on Third Graders' School Lunch Consumption in a School Offering Food Pyramid Choice Menus

The Child Nutrition Programs (CNP) Division of the Oregon Department of Education contracted with the NFM Department of Oregon State University to evaluate the nutritional effect of a four-week nutrition education intervention in a school offering Food Pyramid Choice Menus (hereinafter FPCM). The study was conducted from February through April 1997 and data were analyzed during calendar years 1997 and 1998. The study was designed to answer the following question: Will a four-week nutrition education intervention affect the foods selected and eaten by third graders from FPCM? The specific objectives of the study were to:

1. Determine whether third graders select and /or eat a greater variety of foods from Food Pyramid Choice Menus after receiving nutrition education programming, than before.
2. Determine whether third graders who receive nutrition education programming select and/or eat lunches closer to meeting the Dietary Guidelines for Americans for total fat and saturated fat content after receiving nutrition education programming than before.
3. Determine whether third graders who receive nutrition education programming select and/or eat a greater variety of food from Food Pyramid Choices Menus than do third graders who do not receive such programming.
4. Determine whether third graders who receive nutrition education programming select and/or eat lunches closer to meeting the Dietary Guidelines for Americans for total fat and saturated fat content than do third graders who do not receive such programming.
5. Children who receive nutrition education programming will advance in readiness to change their fruit and vegetable consumption after receiving nutrition education programming.

Executive Summary

Elementary school lunches planned and served under Oregon's Food Pyramid Choice Menus system, are based on the Dietary Guidelines for Americans (DGA) (1). They are designed to comply with current USDA menu standards for school lunches (2). They offer, daily, a variety of high complex carbohydrate, low fat fruits, vegetables and grain products in the form of a variety bar. Elementary school children can select and eat the kinds and amounts of these foods they like. A variety of entrees and kinds of milk is also offered daily. Our larger study "Oregon's Food Pyramid Choice Menus - Do lunches as offered to, and selected and consumed by third graders meet current USDA nutrition standards?" found that only half of third graders selected fruit every day of the week and only 13% selected vegetables every day. Third graders ate 11% of their lunch energy from fruits, 14% from grains and less than 2% from vegetables. At the same time vegetables provided 57% of the vitamin A eaten from lunches. (3). Nutrition education has the potential to increase consumption of fruits, vegetables and grain products and the nutrients they provide, from FPCM.

During four weekly Team Nutrition education (4) programs children played an active role in learning about how the foods they eat grow; the Food Guide Pyramid; healthy meal planning; and taste testing of fruits and vegetables. After the intervention third graders selected and ate more fruits from their lunches and consumed more vitamin A and dietary fiber from lunches that they did before the intervention. Third graders participating in nutrition education activities appeared to be more likely to increase their intake of fruits, vegetables and grain products from lunch than did children from non-participating classes. The intervention did not show evidence of influencing fat consumption from Food Pyramid Choice Menus.

This research demonstrates that the combination of availability of a wide variety of fruits, vegetables and grain products in school lunches and nutrition education programming which increases awareness of these foods - their good taste and their contribution to a well-balanced diet - can have a positive effect on their consumption from school lunches. Other types of nutrition education may be more effective in decreasing fat intake from lunches.

This study was limited by its small size and the results should be considered preliminary. Caution should be used in extrapolating results beyond the study sample. A larger study would be able to confirm or refute the findings presented here.

Methodology:

This research was designed as a revision to the larger study "Oregon's Food Pyramid Choice Menus - Do lunches as offered to, and selected, and consumed by third graders meet current USDA nutrition standards? It was approved, as such, by the OSU Institutional Review Board for the Protection of Human Subjects before it was undertaken.

The study used a pretest-posttest design with an intervention and a control group. One of three third grade classes at Glenfair Elementary School (Reynolds School District) was designated the intervention group and received four weekly nutrition education programs of about one hour each. Programming included Team Nutrition (4) units on *Food Grows, Bodies Grow, Read all about it, and The Great Nutrition Adventure* (Appendix A). Team Nutrition materials are designed to motivate children to make food choices for a healthy diet (5). These units concentrated on fruits, vegetables and grains, the foods offered in Food Pyramid Choice Menus variety bars. Nutrition programming was planned and presented by Caryl Batdorf, a Registered Dietitian. The other two third grade classes constituted the control group and received no intervention.

Baseline data on foods selected and eaten at lunch were collected during one week in February, 1997 as part of the larger study (6). The nutrition education intervention took place during each of the four weeks after baseline data were collected. Three weeks after the fourth nutrition education program, during April of 1997, one week of lunches selected and eaten were measured and analyzed again for the intervention and control groups, using the identical menus as were served during baseline (Appendix B).

Parents and students signed informed consent forms in advance of the study. Food service personnel were trained in assisting with data collection. Data were collected for all five days of both the pretest (baseline) and posttest weeks. Only children who ate a school lunch at least three days of both weeks were included in the study. During the week of posttest data collection children in the study selected their lunches as usual but participating classes went through the lunch line together and sat at tables together as a group. Forty of 66 third graders participated in the posttest. Seventeen of 22 children in the intervention class, and 23 of 32 in the control classes participated. These were the only children from the pretest who participated in this intervention study. Each child's tray was identified by a numbered sticker. After selecting their lunch each child gave their tray to an NFM Department or NETPRO staff member who took it briefly out of sight (for less than two minutes) and measured/weighed and recorded, on pre-printed forms, the food selections and their amounts for each child. The tray was then delivered to the child at her table.

NETPRO Trainers and NFM Department researchers worked with school staff to assure that condiments such as salad dressings, mustard and catsup were self-served into uniform paper condiment cups so that estimates of volume could be standardized. After lunch children left their trays on the tables. Trays were collected and plate waste of each food item was weighed to calculate amounts of individual foods eaten. Lunches eaten were calculated as lunches selected minus weighed plate waste for each child, daily. Lunches selected and eaten were analyzed.

The energy and nutrient content of foods offered were analyzed using NutriKids software (7). The energy and nutrient content of foods selected and eaten were analyzed using Food Processor software (8). Statistical analysis was performed with SPSS mainframe software (9). The one-week average food and nutrient content of lunches selected and eaten were compared between pretest and posttest for the intervention group as well as between the intervention and control groups.

A Parent's Questionnaire (Appendix C) was sent home with children in the intervention class after the fourth nutrition education program. It was designed to measure children's readiness to change their fruit and vegetable consumption. The low response rate limited interpretation of its results.

Results

Question: Will a four-week nutrition education intervention affect the foods selected and eaten by third graders from Food Pyramid Choice Menus?

Objective 1: Determine whether third graders select and/or eat a greater variety of foods from Food Pyramid Choice Menus after receiving nutrition education programming than before.

Objective 3: Determine whether third graders who receive nutrition education programming select and/or eat a greater variety of food from Food Pyramid Choices Menus than do third graders who do not receive such programming.

The data suggest that nutrition education programming may have positively influenced the variety of fruits, vegetables and grain products third graders selected and ate from FPCM lunches. The intervention was associated with a measurable increase in total fruit consumption accompanied by increased intake of dietary fiber and vitamin A from lunches. This is very encouraging since dietary fiber and vitamin A are two of the nutrients third graders were least likely to eat in recommended amounts from FPCM (10).

Table 1 shows the mean number of different fruits, vegetables and grain products selected weekly by third graders in the intervention and control classes before (week 1) and after (week 2) nutrition education programming was conducted in the intervention class. There were no statistically significant differences detected between the variety of fruits, vegetables or grain products selected by the intervention class before and after the nutrition education programming (Objective 1). There were no statistically significant differences detected between the variety of fruits, vegetables or grain products selected by the intervention class and either control class before or after the intervention (Objective 3). An observation of practical significance that can be made from this data is that a much greater variety of fruits and grain products, than vegetables, was selected by children in all of the classes. Stronger efforts to encourage vegetable consumption may be worthwhile.

Table 2 shows the number and percentage of third graders in the intervention class and each of the two control classes whose variety of fruit, vegetable and grain product intake either increased, decreased, or remained the same after the intervention class had four weeks of nutrition education programming. The direction of the results (although their magnitude was too small to be statistically significant) supports the idea that nutrition education programming may have some positive effect on the consumption of fruits, vegetables and grain products. The intervention class was the only class among the three, in which the average variety of fruits, vegetables and grain products eaten, all increased, at least somewhat, after the intervention. A higher percentage of children in the intervention class increased the variety of their intake of foods in all three categories than did children in the control classes. Also, with one exception (vegetables for Control Class 2) a smaller proportion of the children in the intervention class decreased the variety of fruits, vegetables or grain products they ate at lunch from week 1 to week 2. Again, the direction of this data suggests that nutrition education may have had some positive influence on behavior change with respect to eating a greater variety of fruits, vegetables and grain products from Food Pyramid Choice Menus.

Table 3 compares the mean daily increase in energy from fruits, vegetables and grain products selected and eaten from FPCM for the intervention class after nutrition education programming. The average increases in energy from fruits selected (42 kcal per child) and energy from fruits eaten (28 kcal per child) after the intervention are statistically significant and are strong evidence of increased fruit intake from FPCM after nutrition education. Increases in the selection and consumption of vegetables and grain products are much smaller but their direction is positive.

Table 4 shows the mean daily difference in energy and nutrients selected and eaten from FPCM by the intervention class before and after nutrition education programming. Third graders selected lunches with significantly more carbohydrate, fiber and vitamin A after the intervention than before. They ate lunches with significantly more fiber and vitamin A after the intervention than before. This finding is congruent with their increased fruit intake from FPCM after the nutrition education intervention. The vitamin A increase is especially important since it constitutes an average increase of one-third of the 224 RE of vitamin A mandated by USDA (2) to be offered in school lunches.

Table 1

Variety of Fruits, Vegetables and Grain Products Selected by Third Graders in One Nutrition Education Intervention Class and Two Non-Intervention Classes – Before and After the Intervention

	Intervention Class ²			Control Class 1			Control Class 2	
Mean Number of different fruits, vegetables and grain products selected weekly								
	Mean +/- SD	Median		Mean +/- SD	Median		Mean +/- SD	Median
Food								
Fruits								
Week 1 ¹	2.9 +/- 1.9	3		3.3 +/- 1.3	3		2.9 +/- 1.1	3
Week 2	3.5 +/- 1.6	3		3.6 +/- 1.5	4		2.3 +/- 1.1	2.5
Difference	0.5 +/- 1.4	0		0.3 +/- 1.3	0		0.6 +/- 0.9	1
Vegetables								
Week 1	0.7 +/- 0.7	1		0.6 +/- 0.8	0		0.13 +/- 0.4	0
Week 2	1.2 +/- 1.3	1		0.5 +/- 0.7	0		0.5 +/- 0.8	0
Difference	0.5 +/- 1.3	0		0.1 +/- 0.7	0		0.4 +/- 0.7	0
Grain Prod								
Week 1	2.1 +/- 1.0	2		2.4 +/- 1.0	2		2.1 +/- 0.8	2
Week 2	2.2 +/- 1.4	2		0.5 +/- 0.7	0		2.0 +/- 0.8	2
Difference	0.2 +/- 1.0	0		0.3 +/- 1.0	0		0.1 +/- 0.8	0

¹Week 1 and week 2 were compared for the intervention class with the non-parametric Wilcoxon Signed Rank Test.

No significant differences were detected.

²The intervention class was compared with control classes using the non-parametric Kruskal-Wallis Test.

No significant differences were detected.

Table 2

Number and Percent of Third Graders in One Nutrition Intervention Class and Two Non-Intervention Classes whose Variety of Intake of Fruits, Vegetables and Grain Products Increased, Decreased or Remained Unchanged After the Intervention

	Intervention Class N=17			Control Class 1 N=15			Control Class 2 N=8				
	Number and percent of third graders										
	Fruits	Vegetables	Grain Products		Fruits	Vegetables	Grain Products		Fruits	Vegetables	Grain Products
Increased Intake	8 (47%) [†]	7 (41%)	6 (35%)		5 (33%)	1 (7%)	2 (13%)		1 (13%)	2 (25%)	2 (25%)
Unchanged	6 (35%)	7 (41%)	6 (35%)		6 (40%)	11 (73%)	6 (40%)		2 (25%)	6 (75%)	3 (38%)
Decreased Intake	3 (18%)	3 (18%)	5 (29%)		4 (27%)	3 (20%)	7 (47%)		5 (63%)	0 (0%)	3 (38%)

[†]Numbers and percents are frequencies. No statistical analysis is represented.

Table 3

Mean Daily Increase in Energy Selected and Eaten from Fruits, Vegetables and Grain Products by Third Graders After a Nutrition Education Intervention

	Intervention Class	
	Mean Daily Increase in Kcal Selected	Mean Daily Increase in Kcal Eaten
Food Category	N=14	N=14
Fruits	42 kcal** [†]	28 kcal**
Vegetables	3 kcal	3 kcal
Grain Products	7 kcal	2 kcal

[†]Differences in Kcal selected and eaten before and after intervention were compared to 0 using a one-sample t-test.

**p ≤ .01

Table 4

Mean Daily Energy and Nutrients Selected and Eaten from FPCM before and after
a Nutrition Education Intervention and the Difference Between Them

Intervention Class N=17							
	Mean Nutrients Selected				Mean Nutrients Eaten		
	Before	After	Difference		Before	After	Difference
Nutrient							
Energy (Kcal)	616 +/- 86	650 +/- 126	33 [†]		412 +/- 116	437 +/- 144	28
Protein (g)	27 +/- 4	26 +/- 5	-1		17 +/- 7	17 +/- 8	0
Carbohydrate (g)	78 +/- 17	87 +/- 25	9*		55 +/- 16	60 +/- 21	5
Fiber (g)	3 +/- 1	4 +/- 2	1**		2 +/- 1	3 +/- 1	1**
Total Fat (g)	23 +/- 4	23 +/- 4	0		15 +/- 4	16 +/- 5	1
Saturated Fat (g)	9 +/- 2	9 +/- 2	0		6 +/- 2	6 +/- 2	0
Cholesterol (mg)	46 +/- 7	29 +/- 12	-3		43 +/- 13	27 +/- 14	-1
Vitamin A (RE)	245 +/- 80	337 +/- 147	92*		150 +/- 70	256 +/- 130	76*
Vitamin C (mg)	31 +/-15	35 +/- 22	4		20 +/- 11	23 +/- 16	3
Calcium (mg)	439 +/- 84	478 +/- 98	39		265 +/- 126	293 +/- 152	25
Iron (mg)	3 +/- 1	4 +/- 1	0		2 +/- 1	2 +/- 1	0
Sodium (mg)	968 +/- 109	1005 +/- 206	37		645 +/- 222	668 +/- 281	23

[†]Differences in nutrients selected and eaten before and after intervention were compared to 0 using a one-sample t-test.

* p ≤ .05

** p ≤ .01

Objective 2: Determine whether third graders select and/or eat lunches closer to meeting the Dietary Guidelines for Americans for total fat and saturated fat content after receiving nutrition education programming than before.

Third graders did not appear to eat lunches closer to meeting the Dietary Guidelines for Americans for fat or saturated fat after a nutrition education intervention emphasizing consumption of fruits, vegetables and grain products. The data in Table 4 show that the amount of carbohydrate selected from lunches increased after nutrition education while the amount of fat selected was unchanged. The amount of carbohydrate and fat actually eaten from lunches remained unchanged after the intervention.

Table 5 compares the proportion of children in the intervention class who selected and ate FPCM lunches providing various proportions of energy from total fat and saturated fat, before and after the nutrition education intervention. Only about one-third or fewer of the children in the intervention class selected or ate lunches with 30% or less of total energy from fat. Even fewer selected or ate lunches providing less than 10% of energy from saturated fat, either before or after the nutrition education intervention. No significant differences were detected between the fat content of lunches selected or eaten before and after the intervention. Since this particular intervention did not address fat consumption or food sources of fat specifically this finding is not surprising.

Objective 4: Determine whether third graders who receive nutrition education programming select and/or eat lunches closer to meeting the Dietary Guidelines for Americans for total fat and saturated fat content than do third graders who do not receive such programming.

The nutrition education intervention, which emphasized fruit, vegetable and grain product consumption, showed no evidence of influencing fat consumption from lunch, compared with no intervention.

Table 6 compares the intervention class with each of the non-intervention classes by the percent of children who selected and ate FPCM with various proportions of energy from total fat and saturated fat, before and after the nutrition education intervention. Again, there were no significant differences between the intervention and control classes either before or after the nutrition education intervention. Children in the intervention class appeared to eat about the same amount of fat from their lunches as did children who received no nutrition education programming.

Objective 5: Children who receive nutrition education programming will advance in readiness to change their fruit and vegetable consumption after receiving nutrition education programming.

Due to scheduling difficulties beyond the control of the research team the fourth week of nutrition education programming was more limited in scope than planned and parents were not able to participate. A short survey addressing parents' observations of children's readiness to change their fruit and vegetable consumption, had a limited response. Five of 20 parents completed the survey. Most reported that their children had talked about nutrition during the intervention. Respondents indicated a greater willingness to eat fruits than vegetables, on the part of their children. This response supports other findings of greater preference for fruits than vegetables among the study sample.

Table 5

Percent of Third Graders Who Selected and Ate Lunches with Various Levels of Total and Saturated Fat Before and After a Nutrition Education Intervention

	Before Intervention		After Intervention	
	Selected	Eaten	Selected	Eaten
Number and Percent of Third Graders (N=17)				
Mean % of Kcal from Total Fat				
≤ 30%	5 (29.4%) [†]	5 (29.4%)	4 (23.5%)	6 (35.3%)
> 30% but ≤ 32%	2 (11.8%)	2 (11.8%)	1 (5.9%)	3 (17.6%)
> 32% but ≤ 34%	3 (17.6%)	4 (23.5%)	6 (35.4%)	1 (5.9%)
> 34%	7 (41.2%)	6 (35.3%)	6 (35.4%)	7 (41.2%)
Mean % of Kcal from Saturated Fat				
< 10%	1 (5.9%)	3 (17.6%)	3 (20%)	5 (29.4%)
≥ 10% but < 12%	4 (23.5%)	4 (23.5%)	1 (5.9%)	2 (11.8%)
≥ 12%	12 (70.6%)	10 (58.8%)	13 (76.5%)	10 (58.8%)

[†]Percent of third graders in the intervention class who selected and ate each level of total and saturated fat before and after a nutrition education intervention were compared with the Chi Squared Statistic.

No significant differences were found.

Table 6

Percent of Third Graders in Intervention and Non-Intervention Classes Who Selected and Ate Lunches with Various Levels of Total and Saturated Fat

	Before Intervention			After Intervention		
	Intervention Class	Control Class 1	Control Class 2	Intervention Class	Control Class 1	Control Class 2
	N=17	N=15	N=8	N=17	N=15	N=8
Mean % of Kcal from Total Fat in Lunches as Selected	Percent of Third Graders					
≤ 30%	5 (29.4%) 1	1 (6.7%)	2 (25%)	4 (23.5%)	4 (26.7%)	0 (0%)
> 30% but ≤ 32%	2 (11.8%)	2 (13.3%)	0 (0%)	1 (5.9%)	2 (13.3%)	2 (25%)
> 32% but ≤ 34%	3 (17.6%)	2 (13.3%)	1 (12.5%)	6 (35.3%)	5 (33.3%)	3 (37.5%)
> 34%	7 (41.2%)	10 (66.7%)	5 (62.5%)	6 (35.3%)	4 (26.7%)	3 (37.5%)
Mean % of Kcal from Total Fat in Lunches as Eaten						
≤ 30%	5 (29.4%)	3 (20%)	2 (25%)	6 (35.3%)	3 (20%)	1 (12.5%)
> 30% but ≤ 32%	2 (11.8%)	1 (6.7%)	1 (12.5%)	3 (17.6%)	1 (6.7%)	2 (25%)
> 32% but ≤ 34%	4 (23.5%)	3 (20%)	0 (0%)	1 (5.9%)	1 (6.7%)	1 (12.5%)
> 34%	6 (35.3%)	8 (53.3%)	5 (62.5%)	7 (41.2%)	10 (66.7%)	4 (50%)
Mean % of Kcal from Saturated Fat in Lunches as Selected						
< 10%	1 (5.9%)	1 (6.7%)	0 (0%)	3 (17.6%)	2 (13.3%)	0 (0%)
> 10% but < 12%	4 (23.5%)	3 (20%)	4 (50%)	1 (5.9%)	4 (26.7)	3 (37.5%)
≥ 12%	12 (70.6%)	11 (73.3%)	4 (50%)	13 (76.5%)	9 (60%)	5 (62.5%)
Mean % of Kcal from Saturated Fat in Lunches as Eaten						
< 10%	3 (17.6%)	3 (20%)	1 (12.5%)	5 (29.4 %)	3 (20%)	0 (0%)
> 10% but < 12%	4 (23.5%)	2 (13.3%)	3 (37.5%)	2 (11.8%)	2 (13.3%)	4 (50%)
≥ 12%	10 (58.8%)	10 (66.7%)	4 (50%)	10 (58.8%)	10 (66.7%)	4 (50%)

Percent of third graders in each class who selected and ate each level of total and saturated fat before and after a nutrition education intervention were compared with the Chi Squared Statistic. No significant differences were found.

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Appendix A
Nutrition Education Lesson Plans

LESSON 1: FOOD GROWS

Objectives: Students will discover where food comes from and explore the role plants and animals play in the bigger picture of life on earth.

Materials:

1. "Food Works" video.
2. "Food Works" magazine.
3. "My Lab Notes" handout.
4. Plants for each group.
5. Glow light.

Procedure:

A. Introduction

1. State objectives.
2. Show the video.
3. Distribute "Food Works" magazine. Let students read the magazine at their leisure. Remind them to take care of it, as they will need it throughout the unit.

B. Getting Started

1. Ask students to discuss what they ate for lunch. List the items on the flip chart.
2. Have the class trace the "history" of one of the foods listed. They follow the food's journey backwards from the plate to the kitchen, to the store, to the factory, to the farm, to the plant. (Even meat and dairy products can be traced back to plants when students think about what animals and fish eat.)
3. Challenge students to think of anything they have eaten in the last 24 hours that did not, at some point in its existence, depend on plant life.

C. Activity I. "What do living things need to grow?"

Hand out "My Lab Notes".

Students have seen that we depend on plants and animal products for our nutrition. Ask them to brainstorm the conditions under which plants and animals grow strong and healthy. (Write their answers on flip chart) Tell them that in order to examine the connection between healthy conditions and healthy growth, they can investigate what happens when a plant is grown under different conditions. Divide students into four teams of scientists. Give each team a plant. Each team will observe seedlings growing under one set of conditions:

- *with soil, regular watering, and plenty of sunlight
- * with sunlight and water, but no soil
- * with soil and sunlight, but no water
- * with soil and water but no sunlight.

Encourage students to come up with other variables they can test, such as growing one plant inside, and another outside, and so on. Students should clearly record what they deny the plant - water, light, soil, etc.

LESSON 1: cont.

C. Activity 1. (Cont.):

Over the next two weeks, students keep record of what they observe.

D. Activity 2. Kitchen Tour.

1. Arrange for students to tour the kitchen and introduce themselves to food service staff. Before students visit the kitchen, they should prepare questions to ask the staff. Write their questions on the handout "Kitchen Tour":

- *Where does the food come from?

- *Where is it stored?

- *Who cooks the food?

- *Who plans the menu?

Students will write a paragraph about their tour of the kitchen. They can draw a picture about food or something they liked on their tour.

E. Activity 3. Homework.

1. Send "Dear Parent" handout home. Encourage students to continue learning about where foods come from by going to the grocery store with their parents. Ask your parents to discuss which foods are examples of roots, stems, leaves, fruits, flowers, and seeds. Encourage students to try one of each.

E. Evaluation

1. Activity 1. At the end of the two weeks, students compare results. Each team names a spokesperson to tell the class about their experiment. After the results of the experiments have been shared and discussed, students list the things plants must have in order to survive. Then list the conditions that resulted in the healthiest plants.
2. Activity 2. Students will turn in their paragraph on Friday of that week.
3. Activity 3. Students will report to class what foods they saw at the grocery store and if they tried eating a new food this week.

LESSON 2: BODIES GROW

Objectives: Students learn how the Food Guide Pyramid can help them construct a healthy diet.

Materials:

1. "Food Guide Pyramid" and "What Counts As a Serving?" handout.
2. Food Works video.
3. Dry and liquid measuring cups and spoons.
4. Ounce weighing scale.
5. Blender.
6. Food Samples: crackers, bread, cereal, assorted vegetables, strawberries, milk.
7. School lunch menu.

Procedure: A. Getting Started

1. Review the conditions under which plants grow best and the benefits the plants get from the correct balance of soil, light, and water.
2. Now ask students to review the comparisons they were challenged to make between the needs of people and plants in Lesson 1. What benefits would they expect people to get from the correct balance of food, water, and exercise?
3. Challenge students to think up one change they could make in their daily lives that would improve their health.

B. Activity 1. "What Is A Healthy Diet?"

*Hand out the Food Guide Pyramid handout. Allow students time to read it and discuss it. Have them keep it to refer to in upcoming lessons.

*Explain that the Food Guide Pyramid represents a balanced diet to help people make healthy eating choices. Students may need some help deciphering the pyramid.

*Review the food chain discussed in the previous lesson. Challenge students to determine which of the major food groups include foods from plants, which from animals.

C. Activity 2. "How Much Is A Serving?"

*Review the "Munching at the Mall" segment of the Food Works video where the Food Guide Pyramid is discussed and Zelda and Noah interview people about the number of servings they've had from different food groups that day.

*Have students look at the foods brought into class and estimate how many servings they eat at a sitting. For example, if they eat cereal with milk for breakfast, they might estimate that they eat one serving from the grain group and one serving from the milk group.

C. Activity 2. (Cont.)

*Divide students into teams and give each team some of the foods brought into class. Students take turns using measuring spoons, cups, and scale to measure out serving sizes.

*Have students wash their hands. Let students measure milk and strawberries into blender, according to recipe. Blend. Taste test untouched foods and drink.

D. Activity 3. Homework.

*Send Parent Reproducible 3, Building Healthy Meals and Snacks, the Food Guide Pyramid is presented. Ask students to explain the pyramid to their parents.

*Send Parent Reproducible 7, Pyramid Snacks. Encourage students to try the snack suggestions, along with their parents.

E. Evaluation

1. Activity 1. Students will report to the class what their favorite food is and from what food group it comes from.
2. Activity 2. Students will accurately measure ingredients in the drink recipe and will be able to identify what a serving size for grains, vegetables, fruit and milk.

LESSON 3: READ ALL ABOUT IT!

Objectives: Students analyze their diets, and set goals to bring their diets in line with the recommendations in the Food Guide Pyramid.

Materials:

1. Reproducible 6 and 7.
2. Food Works magazine.
3. School Lunch Menu.
4. Food Diary rating form.

Procedure:

A. Before you begin: Ask students if they've done any of the activities with their parents. Remind students of what they saw in the Food Works video. Point out that Noah and Zelda are investigative reporters who get the "inside story" on food. Tell students that in this lesson they will get the inside story on their own diets.

B. Getting Started

1. Working in small groups, students skim the articles in the Food Works magazine, talk about the main ideas of different articles. They should note that the main idea of the story is often contained in the first paragraph. The rest of the story backs up the main point with details and further explanations.
2. Students should also note that stories include menu facts, and reporters often answer the following questions in their story: Who, What, When, Where, Why and How? Ask students to look back at an article and see if they can find the answers to these questions.

C. Activity 1. Keep A Food Diary.

*Ask students to use a piece of paper and to keep a food diary for a 24-hour period. Each student should decide which day they are going to use and tell me. They should record everything they eat and drink during the time.

*Have students fill in the blanks of the Food Diary rating form.

*They also should estimate serving size each time they make an entry because it may be more difficult to remember the size of their portions later on.

*Have students write a newspaper article about their diets and how they stack up next to the Food Guide Pyramid. Remind students that reporters use facts.

*First have student fill in the blanks of the Food Diary rating form. Ask students to categorize the foods in their diaries according to food group. Remind them that many food (such as pizza) have a combination of ingredients and therefore, include foods from several of the food groups. Once they have organized the foods by group, ask student reporters to count and record the number of servings they ate from each group. What are the number of recommended daily servings for

each of the groups according to the Food Guide Pyramid? What food groups did they eat enough servings from? Too many servings from? Too few servings from? On pages 6 and 7 of their Food Works magazine they will see how two students' diets stacked up against the Food Guide Pyramid.

*Based on their article, students determine how they can make healthier eating choices. Have students write one dietary goal for themselves based on the evaluation presented in their article.

D. Activity 2. Homework.

*Send Parent Reproducible 5, Get Energized, home. Discuss the importance of physical exercise for healthy bodies. Explain to students that the handout includes several ideas for exercise they can do at home with their parents.

E. Evaluation.

1. Activity 1. Have students write and turn in their reports on Friday.
2. Activity 2. Ask students which exercises they enjoy the most and what they might try with their parents this week.

LESSON 4: THE GREAT NUTRITION ADVENTURE

Objectives: Students revisit all they have learned about healthy eating, and share this information with family and friends.

Materials:

1. Invitation to Parents.
2. Food samples.

Procedure:

- A. Preparation.
 1. Students decorate and display their art and writing assignments from all they've learned.
 2. Welcome parents.
 3. Introduce the Guest Chef, Tom Ohling.
- B. Activity 1. Guest Chef
 1. Chef will bring together all that the students have learned in an exciting, multi-media presentation.
 2. Food grows, food helps our bodies grow, all foods can be apart of a healthy diet, and FOOD IS FUN!
 3. Students garnish an orange bird.
- E. Evaluation
 1. Activity 1. Students and parents will discuss the art and writing projects around the room.
 2. Students and parents will discuss the physical activities that they've participated in.
 3. Students and parents will have a good time.

Appendix B

FPCM Menu Items Offered during Control and Intervention Periods

SELECTED

REYNOLDS S.D.

M	T	W	H	F	NAME	#	F/R	P								
ENTREES	EA	MILK	EA		FRUIT	EA	1 tsp	1 T	¼ c	VEG	EA	1ts	1 T	¼ c	¼ c	?
Tamales		1 %			Grapes					Carrots						
PB & Jelly		2 %			Apples					Celery						
Spaghetti		NonFat Choc			Oranges					Broccoli						
Turkey Sand					Pears					Cauliflower						
Sub Sand		BREAD	EA		Banana					Beets						
Nachos		Garlic			Fruit Salad					Corn						
Turkey Gravy		White Bread			Cranberries					Salad Greens						
Ham & Cheese		Wheat Bread			Pineapple					Mixed Veggies						
Ravioli		Saltines								Green Beans						
Tuna Sand		Graham														
Burrito		Rolls			OTHER	EA	1tsp	1 T	¼ c	CONDIMENT	EA	1ts	1 T	¼ c	¼ c	
Cheeseburger					Sunflower sds.					Ranch						
Pepperoni					Cupcake					Salsa						
										Ketchup						
										Mustard						
										Butter						
										0						

P
E
M

30

Appendix C

Parent's Questionnaire on "Readiness to Change"



OREGON STATE UNIVERSITY
108 Milam Hall - Corvallis, Oregon 97331-5103
Telephone 541-737-3561 Fax 541-737-6914

Parent's Questionnaire

March 17, 1997

The Department of Nutrition and Food Management at Oregon State University has been conducting a study for the Oregon Department of Education, Child Nutrition Division, in your child's class at Glenfair Elementary School over the past month. The purpose of the study is to help schools serve lunches which are healthy and well liked by children.

In addition to the study at school we are interested to know what you have observed at home about your child's attitude and behavior in regard to fruits and vegetables.

Your participation in filling out this questionnaire is voluntary. All information from the study is completely confidential. All data will only be reported about the class as a whole and not for individual children.

Please sign and return this letter and questionnaire to your child's teacher by Friday, March 21, 1997, whether you check Yes or No. Thank you

☐ Yes, I agree to complete the questionnaire

☐ No, I do not want to complete the questionnaire

Parent's Signature

Date

Connie Georgiou, Ph.D., L.D., Associate Professor
Department of Nutrition and Food Management
Milam Hall 108
Oregon State University
Corvallis, OR 97331-5103 (541) 737-0965 Georgiou@ccmail.orst.edu

Please circle the best answer

1. Has your child talked about nutrition over the past month?

- 1 YES
- 2 NO
- 3 NOT SURE

2. Has your child talked about the Food Guide Pyramid in the past month?

- 1 YES
- 2 NO
- 3 NOT SURE

3. Has your child talked about eating more **fruit** in the past month?

- 1 YES
- 2 NO
- 3 NOT SURE
- 3 a IF YES, what? _____

4. Is your child willing to eat most **fruits**?

- 1 YES
- 2 NO
- 3 NOT SURE

5. Have you noticed a change in your child's willingness to eat **fruit** over the past month?

- 1 YES
- 2 NO
- 3 NOT SURE
- 5 a IF YES, how? _____

6. Has your child changed his/her consumption of **fruit** over the past month?

- 1 YES
- 2 NO
- 3 NOT SURE

7. Has your child asked you to buy any specific **fruit** over the past month?

- 1 YES
- 2 NO
- 3 NOT SURE
- 7 a IF YES, what? _____

OVER 33

8. Has your child talked about eating more vegetables over the past month?

1 YES

2 NO

3 NOT SURE

8 a IF YES, what? _____

9 Is your child willing to eat most vegetables ?

1 YES

2 NO

3 NOT SURE

10. Have you noticed a change in your child's willingness to eat vegetables over the past month?

1 YES

2 NO

3 NOT SURE

10 a IF YES, how? _____

11 Has your child changed his/her consumption of vegetables over the past month?

1 YES

2 NO

3 NOT SURE

12. Has your child asked you to buy any specific vegetable over the past month?

1 YES

2 NO

3 NOT SURE

4 IF YES, what? _____

BEST COPY AVAILABLE